Waste Management & Pollution Prevention

Waste management is "how we handle our trash." Most communities use an integrated approach to waste management, meaning they use a variety of ways to handle the trash produced by their citizens. Some of these include pollution prevention, landfilling, recycling, composting, waste reduction, waste-to-energy plants, hazardous waste disposal, and litter prevention and control.

Landfills

Landfilling is the most popular waste disposal method. It has also been around for the longest time. The ancient Greeks began landfilling when they required citizens to take their trash outside the city gates and dispose of it. Dumps—large holes in the ground where trash was dumped—began this way.

Today we do not use dumps (although some people still call them that). Instead, we use sanitary landfills. Landfills differ because they are lined on the bottom with clay, special plastic, or a combination of both. Modern landfills have leachate management systems built into them and gas management systems to handle the methane gas produced as the waste decays. Every day, the garbage is crushed and covered by a layer of soil to keep out pests and to reduce bugs and odors. These facilities are regulated by state and federal laws and must meet certain criteria or face closure.

In 1987, it was estimated that over half of the existing landfills in the United States would be full by 1996. Siting a new landfill was often very hard and there was a great deal of concern about how we would deal with our trash. In response, an integrated approach to waste management—using a variety of methods—was adopted by many communities to extend the life span of landfills.

Recycling

Recycling is one of those methods. It is an excellent way to reduce the amount of trash going into a landfill and, at the same time, conserve natural resources. Today, recycling programs focus on three key elements: collecting materials; reprocessing or re-making materials; and selling the re-made materials.

Most communities in Virginia have recycling programs in place. Newspaper, glass, metal, and plastic are the most common materials collected and recycled. These materials are generally reprocessed into the same items and used again to make new products. Certain items, such as plastic soda bottles, may be made into plastic toys, or carpeting, or even clothing. A steel car body may end up in its "second life" as a steel bridge.

Item	Recycled By:
Appliances	Co. Convenience/TransferStations
Batteries	Some Battery Retailers
Books	Used Book Stores
Computers	Some Computer Retailers
Clothing, Household Goods	Consignment Shops and Thrift Stores
Metals	Salvage Yards
Motor Oil/Filters	Many Auto Parts Stores/Garages
Music CDs	Some Music Retailers
Packing Supplies	Mail Centers, Packaging Stores
Photography Equipment	Some Camera Retailers
Plastic	Regional Recycling Centers
Tires	County Transfer Stations
Toner Cartridges	Cartridge Remanufacturers
Video Games	Many Video Rental Stores

In addition to more commonly recycled items, communities have learned the importance of recycling things like motor oil, anti-freeze, scrap metal (from appliances), tires, all sorts of paper and magazines, and other forms of plastic. By taking these items out of the waste "stream," communities are helping the state achieve its goal of 25% reduction in wastes statewide.

While some counties and towns have exceeded the 25% goal, others are close to achieving it. That's because successful recycling depends upon a "market" for the collected materials; that is, a vendor or vendors who will buy and use the materials. Some regions in the state do not yet have recycling "markets," but that is changing and, as it does, recycling will become more economical (and available) across the state.

Regional differences still exist, however, because buyers accept materials in different condition. For example, one paper company may only want newsprint, while another may take mixed papers, and a third may only want white paper. A particular

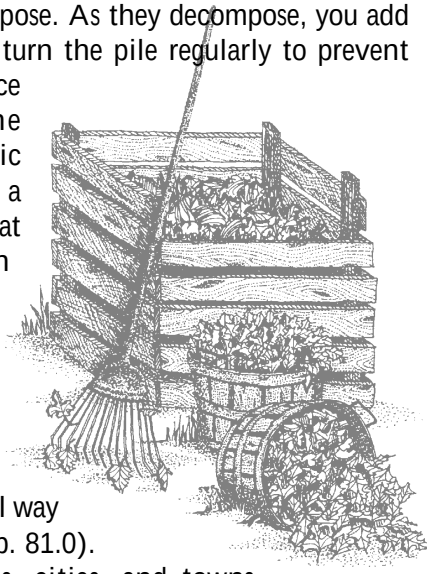
community's recycling "rules" are usually established according to its proximity to buyers and to those buyers' preferences.

Once collected, materials that are reprocessed must be sold at a profit. While early efforts to sell re-made items often faced an "inferiority" complex, consumers today believe in reprocessing and actually look to purchase recycled (and recyclable) materials.

You can help conserve Virginia's natural resources by becoming an active recycler and purchasing recycled products. Recycling requires a little effort and attention to local rules. For instance, if you throw the wrong kind of container into a separated load, you can contaminate the entire load (which will get pulled and thrown into a landfill). Ask for a copy of your community's recycling program rules before you get started. Look at product labels in the store to see if they have recycled content. For your efforts, you will be rewarded with the knowledge that you truly are making a difference to your community's future.

Composting

Another way to help reduce Virginia's waste stream is through composting. Composting is as easy as separating leaves, grass clippings, and other organic materials from your garbage, and placing them in a separate area to decompose. As they decompose, you add layers of soil, and turn the pile regularly to prevent heat build-up. Once decomposed, the mixture of organic materials becomes a rich soil additive that you can use in flower and vegetable gardens or in planting beds. It gives plants the boost they would receive from fertilizer but in a natural way (see Soil chapter, p. 81.0).



Some counties, cities, and towns have a special composting facility or have a contract with a private firm to accept and compost organic materials. Since organic debris make up about 18-20% of a community's average waste stream, composting it will greatly extend landfill space and help meet the state's recycling goals.

Pollution Prevention is the Key

Pollution Prevention, or waste reduction, is the key to reducing the amount of waste going into the waste stream, because it avoids the generation of wastes altogether. It most commonly means re-using items or cutting back on the amount of waste produced. It means planning ahead and purchasing only what is needed so wastes are minimized. When shopping, consumers can request and purchase items with less packaging, or buy re-usable products that create less throw-away material. Buying in bulk whenever possible is one method to reduce packaging. Buying fewer convenience items, such as paper plates and plastic wrap, is another example. Examples of re-usable products are coffee cans used to store nails; baby food jars used for crafts and hobbies; and clothes given away to charitable organizations or people in need. When you begin to focus on what you're throwing away, you'll discover all sorts of uses for items that were formerly considered trash.

Demanding that manufacturers cut down on packaging is yet another challenge for consumers. Asking your favorite maker of laundry detergent to produce a refill alternative is just one example of market pressure from environmentally-sensitive buyers.

All of these ideas can be neatly summed up as the "5 R's" — reduce, reuse, recycle, reject, and respond. We've covered the first three.

u Reject means to consider: "Do I really need this item?" or, "Can I buy it with less packaging?" and "Can I buy a refill instead of a new container each time?" Leave it on the shelf if you don't really need it or it wastes resources.

u Respond means to write or call companies that put out products creating more trash than necessary. Over the past decade, many manufacturers have reduced packaging in response to consumer feedback. You can make a difference! In a nutshell, waste reduction calls upon each of us to become wise, environmentally sensitive shoppers.

The Role of Industry

Just as the waste reduction movement has made us wiser shoppers, many industries in Virginia have found innovative ways to reprocess their waste into less toxic alternatives.

"Waste-to-energy," or resource recovery, plants are facilities that burn trash and convert the energy produced to steam or electricity. They are expensive to

build but reap important benefits—a reduction in trash volume by as much as 70%. They do produce ash, which must be sent to a landfill.

Resource recovery facilities have numerous air pollution controls in place and are heavily regulated, but many people still have concerns about them and about the ash they produce. The steam or electricity produced by a plant is usually sold to a nearby company to keep operating costs down. The northeastern states have more plants than other areas of the country—partly because the Northeast has limited landfill space available.

Hazardous waste disposal has received much more public attention over the last few years. Many people are just becoming aware how much potentially hazardous waste we produce in our homes and dispose of in a typical landfill. Much of this waste should be separated and taken to a special facility equipped to handle hazardous materials or one offering a "household hazardous waste" collection program. Such landfills have double liners and strict safety procedures. Continued education about hazardous waste is needed to help people make wise decisions about products used at home and to encourage consumers to switch to safer cleaning products or dispose of hazardous materials in a safer manner.

Litter prevention and control are other aspects of waste management and include education efforts and community participation in planned clean-up projects. Littering is illegal and it hurts community pride. It is often expensive to clean up and can harm birds, mammals, and fish along the way.

Education about its negative impacts upon animals, humans, and communities is the most effective way to deal with litter. A quick response in the form of community clean-ups is a way to lessen its long-term toll upon everyone.

Waste Management is a complex issue and presents challenges for any community. But improper waste disposal can result in serious health problems, unnecessary and hazardous filling of landfill space, and unwise use of our natural resources. As Virginia citizens, you will benefit from knowing basic facts about waste management so you can make informed personal and community-wide decisions.

Additional Resources

Web Sites:

u Virginia Department of Environmental Quality, Office of Pollution Prevention;
www.deq.state.va.us/opp/opp.html

u U.S. Environmental Protection Agency;
www.epa.gov/oppe/oppe.html

Other Resources:

u Virginia Resource-Use Education Council. "Pollution Solutions" activity book; call (804) 698-4442.

u *Choose to Reduce: Waste Reduction Directory*, Central Virginia Waste Management Authority; Order by calling (800) 732-3493. Great resource, even if you live outside central Virginia.

Fundamental Learnings Related to Waste Management

R Handling and disposing of waste has become an environmental issue because of concerns to public health, pollution of groundwater, location of landfills, depletion of land, and air pollution.

R The rate of waste and types of waste generated are variable. Analyzing what is disposed of can help determine how to manage waste more effectively.

Waste Stream Analysis

Preparation
Collect one or more containers of "clean" household garbage.

Precaution
Due to the possibility of used tissues or broken glass or other sharp objects present, the teacher should provide the trash can or bag for the students to examine. Sort through the classroom trash can and remove all tissues and sharp objects or bring in a bag of garbage from home after removing any items that the students should not be handling (e.g., dirty tissues, diapers, glass of any type, etc.).

Procedure
1. Spread the tarp or plastic out on the floor and dump the classroom wastebasket out in front of the class. Once the garbage is spread out in front of the students, have students put on gloves and assist with sorting the garbage. Separate the trash into as many categories as possible, including non-recyclable and recyclable, reusable, etc. You can use the categories on the data sheet or have the students determine their own categories during this sorting process. Weigh each group of wastes.
2. Leaving the trash spread out and visible, discuss the amount and types of garbage you found. Using the data on the breakdown of Municipal Solid Waste in the United States, compare the classroom sample with national waste composition.
3. Discuss which waste categories could be eliminated by reusing, recycling, or composting.
4. Give each student a data collection page and ask them to keep track of their family's garbage as it is thrown away or placed in the compost or recycling bin. (Allow 2-3 days for completion; if possible, schedule over the weekend). Collect the data sheets and determine a class average for each category. You might want to have information on family size as well. Obviously a family of 4 will produce less waste than a family of 6. Graph the results. Compare this average with the classroom breakdown and also with the national waste composition.
5. Use math skills to determine weights and percentages of materials.
6. Once you have determined how much waste is produced by your class and how much can be removed from the waste stream by recycling, reusing and composting, you can use this data to make an estimate about the amount of waste produced by all classes in the school and all families in the community, and how much can be prevented from going to the landfill or incinerator.

Follow-up Questions and Review
1. Which category represents the largest amount of garbage?
2. Name differences in the types of waste produced at school and at home.
3. How do your results differ from the national averages?
4. Do you see any reason why your results might be different?
(examples are: curbside recycling available in your community; season of year analysis is done — there is less yard waste during winter

Grade Level: 6

Science SOL: 6.11
(can be easily adapted to 4.8 and younger grades)

Materials:
- **Large plastic or paper tarp**
- **plastic gloves for each student**
- **one or more waste containers filled with garbage**
- **bathroom scale**

Objective:
Students will measure by weight how much waste is generated by their families and use this information to make an estimate for their community.

Vocabulary Words:
incinerator
landfill
waste stream

GARBAGE DATA FORM

Name _____ No. People in Household _____

No. Days of Trash Examined (must be 24 hours or more) _____

Did you include the items in a recycling bin? r yes r no

In a separate composting container? r yes r no

Did your family have a special event during the days for the analysis (example: birthday party; spring cleaning; trip to the grocery store; etc) r yes r no

If yes, please describe: _____

Item	#Items	Weight	Recycle	Non-recycle	Compostable	Preventable
White Paper						
Colored Paper						
Newsprint						
Other Paper						
Cardboard						
Glass Containers						
Aluminum						
Other Metals						
Food Waste						
Cleaning Supplies						
Yard Waste						
Milk/drink Boxes/bottles						
Construction Debris						
Scrap Metal						
Recyclable Plastics (by#)						
Non-recyclable Plastics						
Lunch Trays						
Scrap Paper/Magazines						
Other (list)						
Totals						

Total Weight of All Materials:

Total Weight of All Recyclables: % of total weight:

Total Weight of Non-Recyclables: % of total weight:

Total Weight of Compostable: % of total weight:

Total Weight of Preventable: % of total weight:

Discuss why there may be differences among families. In any of the families was there an event that happened that could cause a temporary increase in garbage production? (possibilities: birthday party, trip to grocery store, monthly pizza celebration, etc.)

Conclusion

What is the biggest source of waste in your school and in your home? Can you make suggestions on how to reduce any of these sources of waste.